## REMARKS

Claims 1-20, all the claims pending in the application, stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

### I. The Prior Art Rejections

Claims 1-3, 5, 7-10, 12, 14-17 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yasukawa in view of Chouan or Grinberg et al. (hereinafter "Grinberg"). Claims 4, 11, and 18 stand similarly rejected further in view of Hanihara et al. (hereinafter "Hanihara"). Claims 6, 13, and 20 stand similarly rejected further in view of Admitted Prior Art (APA). Applicants respectfully traverse these rejections based on the following discussion.

#### A. No Prima Facie Case of Obviousness

Before addressing the individual prior art rejections, Applicants note that the Office Action fails to set forth a prima facia case of obviousness. Therefore, all rejections are defective and should be withdrawn. Generally, the fact that the references teach away from the claimed invention, the lack of any objective motivation to combine references, and the large number of references demonstrates that a *prima facia* case of obviousness has not been set forth.

More specifically, the primary reference Yasukawa requires that an insulator (silicon oxide) be positioned as a passivating layer next to the electrodes. This teaches away from the claimed invention that utilizes "a conducting amorphous layer adjacent said liquid crystal material" as defined by independent claims 1, 3, 8, 10, 15, and 17. Clearly, by requiring that an insulator be positioned adjacent the liquid crystal material,

Yasukawa teaches directly away from the claimed invention which utilizes a conducting layer adjacent the liquid crystal material. Any modification of Yasukawa to require a different teaching would fail to set forth a prima facia case of obviousness. Contrary to conventional logic, the Office Action urges that the silicon oxide insulator disclosed in Yasukawa should be considered a conductor because all materials have some level of conductivity, no matter how slight. Applicants respectfully disagree that silicon oxide should be classified as a conductor for a number of reasons, the first and foremost of which is that silicon oxide (and silicon dioxide) are categorized by those skilled in this art field as insulators. Silicon oxide is not used as a conductor. Further, Yasukawa uses the silicon oxide layer 17 as an insulator and calls the layer a "passivating layer." Yasukawa uses silicon oxide to prevent significant change in reflectance due to the variation of film thickness and wavelength of light. Therefore, not only is the Office Action urging a meaning of silicon oxide that is contrary to the well-known meaning, it is also contrary to the meaning intended in the reference. Therefore, because Yasukawa teaches away from the claimed invention, a prima facia case of obviousness has not been set forth.

In order to modify Yasukawa, the Office Action proposes that one ordinarily skilled in the art would have somehow referred to the Chouan reference (which is not related to liquid crystal devices, but instead is related to conventional transistors) and/or to the Grinberg reference (which is directed to a liquid crystal light valve). While each of the secondary references Chouan and Grinberg discloses a layer that has a specific level of resistivity, there is no indication that the layers referenced in the secondary references should be substituted for the insulator layer and Yasukawa. Today's integrated circuit devices use conductive layers and insulating layers. Simply because a reference discloses an insulator layer or a conductor layer with a specific range of resistivity in no way teaches one ordinarily skilled in the art to substitute the insulator layer in Yasukawa for a conductive layer, much less the claimed "conducting amorphous layer adjacent said liquid crystal material, wherein said conducting amorphous layer has a resistivity between $10^4$ and $10^{11}$ ohms-cm" that is defined by independent claims 1, 3, 8, 10, 15, and 17. Therefore, because there is no motivation or teaching in the prior art for substituting the various layers of the secondary references Chouan and Grinberg for the insulator layer of Yasukawa, a prima facia case of obviousness has not been set forth.

It is improper for a rejection to be based upon hindsight reasoning. In this instance, the Office Action selects certain features from one prior art reference and different features from other prior art references in an attempt to recreate Applicants' claimed invention based solely upon Applicants disclosure. In this Office Action, up to four different references are combined in order to form the rejections. This large number of references clearly indicates that the Office Action is based upon hindsight reasoning. Therefore, because the rejections are based upon hindsight reasoning, a prima facia case of obviousness has not been set forth.

Thus, as shown above, a prima facia case of obviousness has not been set forth in the Office Action. The rejections are therefore defective and should be withdrawn on this basis alone. Notwithstanding this deficiency, the merits of the proposed combination of references are discussed below.

**B. The Rejection Based on Yasukawa Chouan, and Grinberg**

Yasukawa does not teach or suggest the use of a diamond-like conductive film adjacent one or both of the electrodes in a reflective LCD device, as in the claimed invention. To the contrary, Yasukawa requires that an insulator (silicon oxide) be positioned as a passivating layer next to the electrodes. The Office Action argues that Yasukawa discloses the amorphous insulator 17 and therefore teaches the "conducting amorphous layer" (claims 1 and 15) and "conducting amorphous diamond-like carbon layer" (claim 8).

Applicants agree that claim language should be interpreted broadly during examination; however, such an interpretation cannot reach the point of being so broad as to contradict the clear meaning of the term being interpreted. Here, the claims clearly define a "conducting" layer that "has a resistivity between $10^4$ and $10^{11}$ ohms-cm". Silicon dioxide is an insulator, unless modified (as with dopant such as Boron or phosphor) so that it changes its insulating characteristics. There is no teaching in the prior art of record of altering the silicon oxide insulator in Yasukawa to include dopants or in any other way to become a conductor.

The Office Action urges that the silicon oxide insulator disclosed in Yasukawa should be considered a conductor because all materials have some level of conductivity, no matter how slight. Applicants respectfully disagree that silicon oxide should be classified as a conductor for a number of reasons, the first and foremost of which is that silicon oxide (and silicon dioxide) are categorized by those skilled in this art field as insulators. Silicon oxide is not used as a conductor. Further, Yasukawa uses the silicon dioxide layer 17 as an insulator and calls the layer a "passivating layer." Yasukawa uses silicon oxide to prevent significant change in reflectance due to the variation of film thickness and wavelength of light. Therefore, not only is the Office Action urging a meaning of silicon oxide that is contrary to the well-known meaning, it is also contrary to the meaning intended in the reference.

Further, the Office Action argues that silicon oxide has a "slight" amount of conductivity. However, this language is not included in the claims. To the contrary, the claims define a "conducting amorphous layer" (claims 1 and 15) and "conducting amorphous diamond-like carbon layer" (claim 8) each of which "has a resistivity between $10^4$ and $10^{11}$ ohms-cm". The terminology "slightly conducting" is not used in the independent claims. Therefore, the position in the Office Action is additionally erroneous because it is reading limitations into the claims that are not there.

Chouan discloses a method of using hydrogenated carbon film to insulate amorphous silicon which is used to form thin film transistors for AMLCD from ions migrated from glass substrates. Therefore, the purpose of this carbon film is insulation. It is repeatedly stated several times in the text, such as column 2 line 65-68, column 3 line 48-49, column 4 line 67, column 5 line 19-23, and in claims 2 and 10 of Chouan. Since the carbon film in Chouan is used to block ions or insulation the resistivity is $10^{12}$ and $10^{14}$ ohms-cm, which is outside the claimed range.

The resistivity of the amorphous carbon film can vary largely from $10^4$ and $10^{18}$ ohms-cm by process parameters and especially by hydrogen concentration, deposition temperature and pressure, bias power and precursors. Usually, the higher hydrogen content films have higher resistances but are softer and not stable. The films with lower hydrogen content have lower resistivity, are harder, and more stable. Therefore, while a carbon film can be insulating, Chouan does not teach or suggest the type of the film used

in the claimed invention and the film in Chouan does not have the properties utilized in the claimed invention. The resistivity of the film in Chouan is between $10^{12}$ and $10^{14}$ ohms-cm, which is above the claimed range of between $10^{4}$ and $10^{11}$ ohms-cm.

Grinberg describes a method of making electron beam addressed LCD with a partially conducting material to absorb the electrons from the electron beam to control the voltage across the liquid crystal. The function of the partially conducting material in Grinberg is to absorb electrons and lower the resistivity of the electrode at the location where the e-beam is to shine makes the composite electrodes conductive and turns on the pixel. This layer is part of the electrodes and not in contact with liquid crystal. There is no teaching or suggestion that this layer should be used adjacent the liquid crystal.

In addition, the layer 10 or 10a in the Grinberg is clearly described as a passivation layer and is defined to be an "insulating film" in column 3 line 55. Further, Grinberg describes that the resistivity of the partially conductive layer 24 is preferably within the range of about $10^{9}$-$10^{11}$ ohm cm in column 5 line 4. From the position and function of the partially conductive layer 24 in Grinberg's teaching, the partially conductive film 24 is neither used adjacent to the liquid crystal 8 nor as "passivation" layer. The passivation film 10 and 10a in Grinberg's patent is clearly stated to be an insulation film to provide electrical and chemical isolation. Although the resistivity of the insulation layer is not mentioned in the patent, it should be higher than that of partially conductive layer 24 which must be higher than $10^{11}$ ohm cm. The insulation layer 10 and 10a in Grinberg's patent is the same type as the layer 17 of Yasukawa. Therefore, no teaching in Grinberg would lead one ordinarily skilled in the art to substitute a conductor in place of the insulator layer 17 of Yasukawa.

As shown above, Applicants respectfully submit that in attempting to broadly interpret the claim language and the teachings of the prior art, the Office Action has exceeded what is permitted. More specifically, classifying the passivating layer of silicon oxide in Yasukawa as a conductor exceeds the boundaries permitted on broad interpretation. The claims clearly and unambiguously define a "conducting amorphous layer" (claims 1 and 15) and "conducting amorphous diamond-like carbon layer" (claim 8) each of which "has a resistivity between $10^{4}$ and $10^{11}$ ohms-cm." To the contrary,

Yasukawa discloses a passivating layer 17, nothing more. Therefore, Yasukawa does not teach or suggest the claimed invention.

As explained in column 16, lines 51-59 of Yasukawa, the prior art requires a passivating insulator 17. This requirement to use an insulator 17 teaches away from the claimed invention which uses a "conducting amorphous" layer adjacent at least one of the electrodes. These secondary references Chouan and Grinberg do not include any teaching that would modify this insulator layer 17 into a conductor. Therefore, Yasukawa does not teach or suggest the invention as defined by independent claims 1, 8, or 15 and these independent claims are patentable over Yasukawa. Further, dependent claims 2, 5, 9, 12, 14, 16, and 19 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view the forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

### C. The Rejection Based on Yasukawa, Chouan, Grinberg, and Hanihara

Hanihara does not cure the deficiency of the combination of Yasukawa, Chouan, and Grinberg, shown above. More specifically, Hanihara does not teach or suggest the conductive amorphous layer defined by independent claims 1, 8, and 15. Indeed, Hanihara is only referenced for showing that silicon oxide has a unidirectional orientation matched to the liquid crystal material and is not intended to teach or suggest a diamond-like conductive amorphous layer. Therefore, any combination of Hanihara and Yasukawa would not teach or suggest "a conducting amorphous layer adjacent said liquid crystal material"; "a conducting amorphous diamond-like carbon layer adjacent said liquid crystal material"; or "forming a conducting amorphous layer on at least one of said first-type electrode and said second-type electrode adjacent said liquid crystal material," as defined by independent claims 1, 8, and 15, respectively.

Therefore, independent claims 1, 8, and 15 are patentable over any combination of Yasukawa and Hanihara. Further, dependent claims 4, 11, and 18 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view the

forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

**D. The Rejection Based on Yasukawa, Chouan, Grinberg, and APA(Lu)**

Neither Lu, Hanihara, Chouan, Grinberg, nor Yasukawa teach or suggest the conductive amorphous layer defined by independent claims 1, 8, and 15. Lu teaches using the same material of one electrode (the transparent one) to cover the other to balance work function. Indeed, Lu and Yasukawa affirmatively teach away from the claimed invention by requiring a passivating insulator adjacent the electrodes. Lu teaches the use of a conducting layer to balance the work function. Due to this layer's high conductivity, an extra photolithographic step is required in Lu to avoid shorting the pixels together. Such processing is very difficulty to achieve. As shown above, the claimed invention is fundamentally different than any of the teachings in the prior art. The invention avoids flicker LCD problems by using a conducting thin film, e.g., diamond-like carbon (DLC) film, coated on both the Al and ITO electrodes of reflective LCDs to reduce and stabilize the Vcom shift. The conducting film allows electrical charges to flow toward the electrodes and bend the Fermi level of the adjacent electrode and balance the surface potential. Thus, with the invention, the Vcom shift is small and stable so that the display can be operated in the frame-inversion drive with a frame rate lower than 70 Hz without perceivable flicker.

Such features are simply not taught or suggested by the prior art of record. More specifically, none of the applied references teaches or suggests "a conducting amorphous layer adjacent said liquid crystal material"; "a conducting amorphous diamond-like carbon layer adjacent said liquid crystal material"; and "forming a conducting amorphous layer on at least one of said first-type electrode and said second-type electrode adjacent said liquid crystal material," as defined by independent claims 1, 8, and 15, respectively.

Therefore, independent claims 1, 8, and 15 are patentable over any combination of Yasukawa and Lu. Further, dependent claims 6, 13, and 20 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by

virtue of the additional features of the invention they define. In view the forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

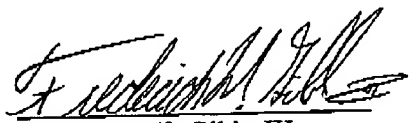
## II. Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-20, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 50-0510.

Respectfully submitted,



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